SUGGESTIONS REGARDING THE

MANAGEMENT OF THE LEASED FORESTS

OF

BUSÁHIR

IN THE

SUTLEJ VALLEY OF THE PUNJAB,

BY

D. BRANDIS, F.R.S., C.I.E.,

INSPECTOR GENERAL OF FORESTS TO THE GOVERNMENT OF INDIA.

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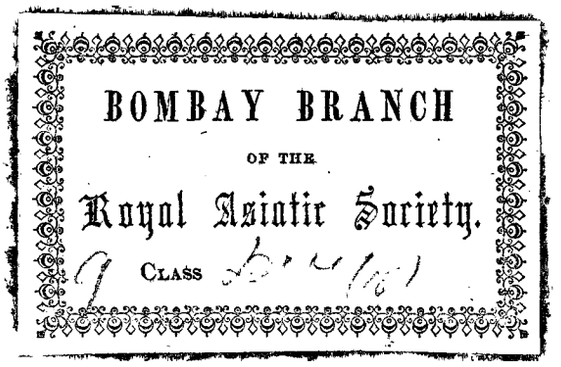

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SUGGESTIONS

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Introduction.

The leased forests of Busáhir are situated partly in the valley of the Sutlej river and its tributaries, partly in the valleys of the Pabar and Rupin, which are both tributaries of the Tons river. The last-named forests are under the control of the Conservator of Forests of the School Circle in the North-Western Provinces, while the Sutlej Forests are in charge of the Conservator of the Punjab.

2. The present report Relates to the Sutlej Forests only. It is the result of an inspection made in May and June 1881 in company with Dr. Schlich, the Conservator of the Punjab.

The former inspection reports which are referred to in these pages, are the following:—

I.—Report on the Deodar forests of Busáhir, being the result of a tour made through the Sutlej Forests in September and October 1864 by the writer of the present Report, in company with the late Dr. Stewart, Conservator of Forests in the Punjab, and Captain Wood, Conservator of Forests in Oudh; published in 1865.

II.—Journal of a tour made in the Deodar forests of Kunáwár in October and November 1869; printed by the Conservator of Forests, Punjab, in 1872.

III.—Preliminary working plan of the Sutlej Working Circle, being the result of a tour undertaken in September and October 1874; published in 1875.

Organization.

3. In the Report of 1874 it was proposed to include the outer Seoraj Forests in Kulu within the Sutlej Working Circle. This suggestion has not been carried out, and they will not be referred to in the present Report. Excluding these, the Forest ranges will stand as follows:—

I.—Nogli Range—from Kotgarh to the Darn-ghati and Gaura ridge. In this range should eventually be included the Government forests of Kotgarh and Kotkhái, when handed over to the Forest Department.

II.—*Tranda Range*—from the Darn-ghati ridge to the ridge which separates the Lower and Upper Panwi-gad, and which meets the Sutlej at Wangtu.

III.—*Kilba Range*—comprising the forests south of the main river between Wangtu and Sapni. In this range the chief timber operations and works for the improvement of the forests will, during the next period, be concentrated.

IV.—*Kailás Range*—comprising the forests on the Baspa river, and those south-east of the Sutlej, above the junction of the two rivers.

V.—*Chini Range*—comprising the forests above Wangtu on the north-west side of the river.

VI.—*Pandrabis Range*—comprising the forests on the north side, as far as the ridge which overhangs Chergaon and which separates the valley of the Wangar from that of the main river.

Besides these, the charge of the river from Rámpur downwards to the first catching depôt near Naila forms one range in charge of a Forester. Under the existing organization, the officer in charge of the lower river, below the upper catching depôt, is not subordinate to the Divisional officer of Busáhir.

Establishment.

4. At present it will suffice to have a Forester in charge of each of these six ranges, but eventually some of the more important ranges, at least, should be in charge of Forest Rangers. Of the Foresters now in charge, one is a native of Kunáwár, and all the others are men who have been long resident in the valley, who possess local knowledge and personal influence among the people, who regard the country as their home, and who are content to serve here. It is most desirable that men of this class should always be in charge of these ranges, and that as many of them as possible should be natives of Kunáwár. Service in the forests of this Division requires first of all a strong physique, good local knowledge, and influence among the natives, and these qualifications cannot be compensated by a high standard of education. I feel assured that, for some time to come, it will be necessary to be satisfied in this Division with a lower standard of education than is required elsewhere.

5. In the following pages it will be explained that a great variety of heavy and important work is proposed, and for this the Divisional officer will require help in addition to the ordinary range officers. This help may be given by posting Probationers to the Division; and, considering the instructive nature of this work, and the vicinity of the forests of the School Circle, it is for consideration whether some of the students at the Forest School may not usefully be employed in the forests of the Sutlej valley.

Walnut and Boxwood.

6. With regard to the material saleable from these forests, matters are still in the same state as when the Report of 1874 was written, and it will suffice to refer to the remarks then made. There is in many of the side valleys below the Baspa river a large number of walnut trees of all sizes, and in places we noticed numerous seedlings and saplings. The possible extraction of this wood should be kept in view, but at present the demand, except for pieces of figured wood (burrs), is not sufficient to justify any but experimental consignments.

7. The boxwood localities are as yet very imperfectly known. There are two tracts in the Nogli valley—one on the south side at Derkarli (formerly worked), and the other higher up at Khasapad, not examined in detail, but said to be extensive; two tracts in Pandrabis (Gunu-gad 1,783, and Ky-gad 2,000 trees above 2 feet in girth); two strips in the lower Panwi-gad. Besides these there are scattered trees in many places—for instance, in the lower part of the Wangar valley near its mouth, along the left bank of the main river, at the foot of the Dippi Forest, and at Sholtu. Considering the large and increasing demand for this wood and the high prices, it is most desirable that the resources of

this wood in this Division should be thoroughly ascertained. The tree will doubtless be found in many places besides those named. I suggest the following girth classes for boxwood:—

I Class, girth above 18 inches.
II „ „ 12 to 18 „
III „ „ 6 to 12 „
IV „ „ below 6 „

Blue Pine.

8. Of coniferous trees besides Deodar, *Pinus excelsa*, the Blue Pine, is the only one for which a certain, though limited, demand, may now be reckoned upon. With reference to what was stated in the Report of 1874, it may be mentioned that it is expected that four annas a cubic foot will cover the cost of delivery at Phillour; and as the sales effected during the last year have yielded about five annas per cubic foot, limited quantities may be sent down annually:—

The following figures show the quantity of this wood extracted during the last seven years.

Timber of Blue Pine (Pinus excelsa) *removed from the Busáhir Forests between 1874 and 1st April 1881.*

No.	Name of forest or locality.	1874-80.			1880-81.			Total.		
		Trees.	Logs.	Cub. ft.	Trees.	Logs.	Cub. ft.	Trees.	Logs.	Cub. ft.
1	Lipi ...	...	...	...	110	695	7,645	110	695	7,645
2	Sapni ...	200	688	11,008	...	...	...	200	688	11,008
3	Rámni ...	...	...	...	1,200	3,800	68,400	1,200	3,800	68,400
4	Yani ...	...	...	...	196	1,269	15,228	196	1,269	15,228
	Total ...	200	688	11,008	1,506	5,764	91,273	1,706	6,452	1,02,281

9. The proposal made in 1874 was that about 300 trees should be cut annually, and that they should be cut in forests where this tree is mixed with Deodar. The quantity actually cut has been about 244 trees a year on an average. But the mistake has been made to cut a very large quantity (1,500 trees) in one year. For the future I would suggest that no separate operations for the extraction of this tree be undertaken, and that it be cut only with the distinct object of promoting the growth of Deodar, care being taken not to overstock the market.

It is not likely that the wood of *Pinus longifolia* will ever be largely exported from this Division. The forests of this tree on the Sutlej are of very limited extent.

Deodar.

10. These remarks will explain that Deodar is as yet the only tree which can be exported on a large scale from these forests, and the statement appended to this Report gives the estimate of the growing stock of Deodar trees, in girth six feet and upwards, in accordance with the latest information.

Nogli Range.

11. The present estimate of the first class Deodar in the Nogli Range is 10,710 trees. These forests are found in numerous scattered patches of small extent. The main river running here at an elevation of 2,700 feet, and the chief Deodar localities being found between 7,000 and 9,000 feet, it follows that they are at a considerable distance from the river, in some cases six to eight miles. It is not likely that either of the three principal streams, the Bera, Mashada and Nogli, can be used for floating timber, except in the form of scantlings. The Deodar on the Mashada-gad and Nogli were counted in 1880: the figures entered in the statement opposite the other

forests are mere estimates. In most forests of this range protection is the only work that requires attention at present.

The forests above Gaura require special mention here. They occupy the north face of the high range which extends eastward from the Siker peak (10,136 feet), and in places they are said to contain a large proportion of Deodar. One of these is the Kalali Forest at the head of the Beshari-gad, which stream is crossed by the road from Gaura to Rámpur. These forests overhang the main river, and it will probably not be found difficult to arrange for the extraction of timber from them.

Tranda Range.

12. In the Tranda Range the number of first class trees is entered as 7,257. The figures under Manglad and the Lower Panwi-gad are only estimated, while the other figures are based upon actual countings; but it should be borne in mind that isolated trees near Nachar and elsewhere have not been taken into account. The main river being at 5,000 feet at the upper end of this range, it follows that the extraction of timber growing on slopes which overhang the main river is easy, while the trees growing on the Manglad, Chaunda and other feeders can only be exported in the shape of scantlings.

Kilba Range.

13. The stock of first class Deodar in the Kilba Range is entered as 16,311; but it must be borne in mind that this includes the forests of the Púnang valley and others, the contents of which have only been roughly estimated, and it is probable that the growing stock in this range will be found to be much larger. As already stated, the principal timber operations and works for the improvement of the forests during the next period will be concentrated in this range.

Kailas Range.

14. Regarding the contents of the forests comprised in the Kailás Range, no more recent information than what is given in the Report of 1874 is available. This range includes the Poari Forests held on a separate lease, and it may here be useful to state that, according to information locally obtained, these forests are bounded on the west by the Raldang-gad, the eastern branch of the stream which joins the Sutlej above the village of Barang, and on the east by the Korang-gad, a small feeder of the Sutlej, which it joins about one mile below the village of Purbani.

Chini Range.

15. The figures entered under the Chini Range are only rough estimates, and are the same as those recorded in the Report of 1874. The highest Deodar in the Sutlej which is available for export is on the Lipi stream, and though scattered patches of the tree are found higher up, they have not been included in the statement appended to this Report. At the mouth of the Tedong the Sutlej flows at an elevation of 7,000 feet: here, therefore, the Deodar forests are close to the main river.

Pandrabis Range.

16. In the Pandrabis Range the trees on the Wangar, Kachang, Rupi, Kyuncha, Gunu, and Kandrara-gads (Busáhir side) have been counted, while the figures relating to the others are rough estimates only. With reference to the recommendations made in the Report of 1874, it may be mentioned that detailed reports have been submitted regarding the forests on the Kandrara and Gunu-gads, with detailed proposals for working them. For the next period, however, the work in Pandrabis will be chiefly protection and the extraction of dry timber.

Summary.

17. Including Seoraj, the estimate of 1874 amounted to 108,454* first class trees.

* The difference of 1,000 trees between the figures given in 1874 and those in the opening column of the appended statement, which does not include Seoraj, is due to the fact that 1,000 trees estimated to stand in the Upper Panwi-gad were omitted from the statement of 1874, as at that time it was thought that these trees could not be worked out in the log.

Based upon this estimate, and upon what was then known regarding the rate of growth of Deodar, the proposal was made to fix the maximum annual yield at 2,000 Deodar trees above 6 feet in girth. There is no ground at present for modifying this estimate, which, it must be distinctly understood, is in no way intended to mean that this figure represents the annual possible yield of these forests. To determine their possible annual yield would require a much more detailed knowledge of the forests than we at present possess. Nothing more is intended than that, in our opinion, 2,000 trees above 6 feet in girth may be cut annually in the Sutlej Forests of Busáhir with due regard to proper conservancy principles.

Former yield of the forests.

18. It will now be convenient to consider what timber these forests have yielded up to date. The older data are taken from paragraph 5 of the Report of 1874.

	Trees.
Before 1864	30,000
From 1864 to 1874	16,000
,, 1875-76 to 1880-81	3,309
Cut by villagers, or on account of His Highness the Raja, since 1874	922
Total ...	50,231

Of this quantity, 20,231 have been cut since 1864, which is at the rate of 1,264 trees per annum.

Hence, if our assumption is correct, the cuttings made during the last 16 years have been far below what the forests can actually yield.

Growing Stock.

19. It is not proposed in this Report to enter upon the question, whether the smaller classes are sufficiently numerous to justify the expectation that 2,000 Deodar trees a year will reach first class size. Nor do we propose, at present, to determine whether the areas stocked with younger growth are sufficient to replace the trees which we propose to remove annually. Some general remarks, however, are necessary. The valuation surveys made in 1864 gave, on 652 acres, 3,743 first class and 4,099 second class trees. Since 1874 a number of forests have been examined, chiefly by Mr. Minniken, Assistant Conservator of Forests, and the result of the countings of the first three classes (trees above 18 inches in girth) is given in the abstract below :—

Abstract of valuation surveys made in the Busáhir Forests between 1874 *and* 1881.

No.	Name of forest or locality.	Deodar trees.		
		I Class, above 6 ft. girth.	II Class, 4 ft. 6 in. to 6 ft. girth.	III Class, 1 ft. 6 in. to 4 ft. 6 in. girth.
	I.—Nogli Range.			
1	Mashada-gad	6,501	8,771	9,121
2	Nogli-gad	3,009	2,435	4,489
	Total ...	9,510	11,206	13,610
	II.—Tranda Range.			
3	Kandalú	220	64	51
4	Chaunda	2,090	1,087	3,759
5	Tranda	385	82	279
6	Rikhiapani	525	225	377
7	Kangose and Poinda	87	624	756
8	Sungri	1,400	748	1,095
9	Guterang	121	322	710
10	West Nachar	608	288	318
11	East Nachar	936	416	446
	Total ...	6,372	3,856	7,791

No.	Name of forest or locality.	Deodar trees.		
		I Class.	II Class.	III Class.
	III.—Kilba Range.			
12	Dippi	510	956	1,787
13	Kakstal	1,342	1,007	1,595
14	Phinla	503	1,340	4,701
15	Jampan	1,002	995	4,005
16	Tikru	959	859	2,473
	Total ...	4,316	5,157	14,561
	IV.—Pandrabis Range.			
17	Tonach (Wangar)	4,267	2,280	2,283
18	Yeti (Wangar)	205	103	99
19	Kashang-gad	2,235	444	469
20	Chota Kamba	1,978	745	349
21	Rupi	132	50	91
22	Khau	2,043	951	671
23	Kyuncha	1,701	400	269
24	Gunu-gad	9,972	1,560	2,226
25	Kandrara-gad	7,399	932	1,854
	Total ...	29,932	7,465	8,311
	Abstract.			
I	Nogli Range	9,510	11,206	13,610
II	Tranda Range	6,372	3,856	7,791
III	Kilba Range	4,316	5,157	14,561
IV	Pandrabis Range	29,932	7,465	8,311
	Total ...	50,130	27,684	44,273

It should be stated that in the Nogli Range the trees were counted by subordinates, whereas all the other surveys were made under the personal supervision of responsible officers, and may, Mr. Minniken considers, be depended upon.

It will be noticed that, in the forests of the Pandrabis Range, the mature trees preponderate, and that the trees of the smaller classes are comparatively few, the reason being that, with few exceptions, none of these forests have ever been worked. They are in the condition in which the forests of Tranda and Kilba were before cuttings commenced.

It will also be noticed that in some forests, such as Kangose, Poinda, and Guterang, the number of the smaller trees largely exceeds that of the first class. These forests have not been worked for timber, but considerable areas have been cleared for *korali* cultivation, and have become stocked with trees of the smaller classes.

20. In these late surveys nearly one-half of the first class trees estimated to stand in the whole of the forests have been counted, and if we apply the proportion to the whole, the conclusion is that the present growing stock of the three classes stands as follows :—

I Class, 6′ in girth and upwards	=	... ...	104,000
II „ 4′ 6″ to 6′ in girth	=	... ...	56,000
III „ 1′ 6″ to 4′ 6″ in girth	=	... ...	88,000

We must, however, guard against the idea that these figures correctly represent the entire growing stock of Deodar in these forests. Mr. Minniken is of opinion that the forests not included in this statement contain far more than an equal quantity of Deodar; and, with regard to the smaller classes, it must be remembered that, on the outskirts of the regular forests, there are numerous groups of poles and smaller trees which have not been included in these countings. The surveys made in 1864 gave a slightly larger number of second than of first class trees. Under these circumstances, we are justified in assuming that, in the whole of the forests, the trees between 4′ 6″ and 6′ in girth nearly equal those of the first class.

Rate of Growth.

21. The study of the rate of growth of Deodar in Busáhir, the results of which are recorded in paragraphs 15 to 20 of the Report of 1864, have led to the conclusion that, in the forests in question, a tree 4′ 6″ in girth requires, on an average, 35 years to attain a girth of 6 feet. Since that time no extensive observations regarding this subject have been made, but the data which have been collected tend to confirm the conclusion formed in 1864. In restricting the annual cuttings to 2,000 trees, we allow 50 instead of 35 years for the trees of the smaller classes to attain a girth of 6 feet, and this period, it may safely be assumed, will in most forests suffice to bring up to that size a sufficient number of the trees of the smaller classes to replace those removed during that period.

We do not, however, propose solely to rely on the natural regeneration of these forests, but to aid it by planting and sowing, and other cultural operations; and it is evident that every acre successfully stocked with young growth by artificial means will justify increased cuttings.

Expected outturn: Green trees.

22. The trees cut during the last six years have given the following outturn:—

Deodar timber (green) removed from the Busáhir Forests during the six years from the 1st April 1875 to the 31st March 1881.

No.	Name of forest or locality.	Trees.	Logs.	Cubical contents of timber launched.	Outturn per tree in cubic feet.
1	West Nachar	150	680	16,171	108
2	East Nachar	590	3,574	57,610	98
3	Dippi and Kakstal	440	2,260	32,600	74
4	Yani	219	1,464	23,424	107
5	Phinla	300	1,844	27,450	91
6	Jampan	100	620	9,300	93
7	Tikru	1,210	7,442	107,488	89
8	Kilba	300	1,400	19,600	65
	Total ...	3,309	19,284	293,643	89 (average.)

Note.—In addition to the above, the following trees were cut in January and February 1881, the produce of which has not yet been launched:—

	Trees.
In Tikru	386
„ Tiúden	728
Total ...	1,114

The cuttings were all made in the Kilba Range and in the Nachar Forests, and the size of the trees cut may be accepted as a fair average for the ranges in which the timber operations during the next ten years will be carried on. In order, however, to be on the safe side, we assume that the trees to be cut during the next five years within this range will each yield, at depôt, 75 cubic feet only on an average. On this assumption, we may expect that the 2,000 green trees proposed to be cut annually will furnish 150,000 cubic fect of timber at Phillour.

Dry timber.

23. In addition to the green trees, however, there will be an annual supply of dry timber, the result of windfalls, dead trees, and timber left over from former operations. The extraction of dry timber is of considerable importance, and this part of the business has been developed with great success by Mr. Minniken.

We have considered whether these dry timber operations should not be arranged on a regular system, and in some respects this would certainly be an

advantage, as control would be more efficient, and slides made for the extraction of the timber might be built on a regular plan. We have however come to the conclusion not to lay down any definite rule on this subject, but merely to say that as much dry timber as possible should be extracted. It requires no explanation that dry timber deteriorates much more rapidly than growing trees, and that the extraction of this material forms an excellent preparation for the larger works required for the extraction of green timber.

During the last two years 1879-80 and 1880-81, altogether 102,410 cubic feet of dry timber have been taken out and launched. We may expect an annual outturn of at least 50,000 cubic feet, but we desire it to be distinctly understood that this is not to be regarded as the limit of the operations. The result will, we expect, be that upwards of 200,000 cubic feet of Deodar timber, green and dry, will in future be delivered annually at the Phillour Depôt.

Work to be undertaken during the next five years.

24. As already explained, the timber operations during the next five, and probably ten, years will all be in the forests of the Kilba Range and in the Nachar Forests, the only exception being the extraction of dry timber, which will proceed simultaneously in all ranges. From the statement appended to this Report it will be seen that the total number of first class trees in the Kilba Range is estimated at 16,311 only. If we add Nachar with 804 trees, the total number is raised to 17,115. This estimate, however, is incomplete as regards the forests in the Púnang valley, and it does not include numerous other areas which contain a considerable number of first class trees. As far as our present knowledge goes, we feel assured that, making allowance for the trees which must be left standing, five years' yield can be taken from these forests at the rate of 2,000 trees a year.

In accordance with the proposals of the Report of 1874, the fellings since 1st April 1875 have been confined to the forests south of the main river, between Nachar and Kunai; but, as already explained, instead of 12,000 trees, only 3,309 have been cut; and an examination of the forests in question, and of the other forests of the Kilba Range, has led us to the conclusion that further cuttings on a large scale must be made, in order to ensure the proper regeneration of these forests.

Cuttings how to be regulated.

25. As regards the general principles which should guide the Divisional officer in these cuttings, the views formed after our late visit are somewhat different from those set forth in the Report of 1874. The natural reproduction of Deodar in those forests where cuttings have been made since 1864 is, upon the whole, exceedingly satisfactory, and would probably be more uniform if those cuttings had been heavier. We are of opinion that the best plan to follow in these forests is to make clearances of a limited size, not exceeding as a rule 100 feet in width, and never continuous for any distance down the slope of the hill, so as to prevent the formation of gullies, in which young growth is kept down by the gliding down of snow and the rush of water.

These clearances will be of irregular shape, and they should be separated by groups and belts of poles and vigorous (whenever practicable young) trees. These groups and belts will in many cases occupy spurs and ridges; but, wherever necessary, trees should be left standing in depressions and hollows, so as to prevent the formation of bare gullies by the action of snow and water.

With the exception of exposed situations at high elevations near the upper forest limit, the damage done by storms in these forests is exceedingly small, and the experience gained on our present tour seems to justify our laying less stress upon the necessity of having protection belts than was done in 1874.

26. In thus advocating a system of heavier cuttings than was recommended in 1874, we have not lost sight of the fact stated in paragraph 41 of the Report of 1864, that numerous and extensive forest tracts have been completely destroyed by excessive fellings made by contractors in former years. In all parts of the valley there are extensive slopes with numberless old stumps of trees,

and no young growth whatever; and these bare slopes, which were at one time stocked with valuable forest, must always remain a warning against clearances on a large scale, in places where the ground is not already covered with young growth. At the same time it must be borne in mind that the destruction of forest caused by the older cuttings has been greatly aggravated by the action of fire, and in places by excessive grazing.

27. What we propose should be made at present are clearances of limited extent, which, after cutting, will be carefully protected against fire, and, wherever practicable, against sheep and goats, and which shall always be surrounded by standing forest, to shed seed and to moderate the action of the sun and of excessive evaporation. We are fully aware that the plan here sketched will require a great deal of judgment on the part of the Divisional officer in carrying out these cuttings. His aim should be to make sure that his operations will result in a complete crop of young growth on the ground. In places where such young growth already exists at the time the cuttings are made, the question is simple enough, and the general rule, to cut out all marketable trees standing over advance growth, may be acted upon without hesitation.

28. It must be distinctly understood that the remarks here submitted have reference specifically and exclusively to the Kilba Range and to the Nachar Forests, and that they are not necessarily applicable to any other parts of the Division. In the drier forests of upper Kunáwár, for instance, which form the greater part of the Kailás and Chini Ranges, young growth of Deodar will require the shelter of older trees much longer than in the moister forests of the Kilba Range.

In upper Kunáwár, where the sky is clear through the whole of summer, the influence of the sun is much more powerful than in the lower part of the valley. The soil is more dry, there is less shelter from shrubs and small trees, and evaporation is much more rapid. In the forests of the Kilba Range young plants three to five years old, do not, it appears to us, require, as a rule, the protection of the larger trees, but are enabled to hold their own by the greater moisture of climate and soil, with the aid of the partial shelter which the numerous shrubs of *Abelia*, *Desmodium*, and other kinds afford. On the other hand, the forests of this range are much more favourably situated, as compared with the still moister regions south of the snowy range on the Pabar, in Jaunsár, and in Kulu. In those forests the growth of brambles, shrubs, ringall, herbs, and grass is so profuse that seedlings are frequently smothered by it, and the undergrowth effectually prevents the springing up of seedlings; whereas, in the range to which the present remarks relate, the young plants of Deodar are much less impeded in their development by difficulties of this kind.

29. Where advance growth is wanting, the selection of the trees to be felled is of course more difficult. In such places it should always be borne in mind that the Deodar seed does not, as a rule, travel to any considerable distance from the parent tree, but that it falls down in great masses in its immediate vicinity. Although, therefore, we do not advocate that a uniform sprinkling of seeding-trees should be left on the ground, we must urge that in such places the size of the clearances be so arranged as to give the whole area a good chance of being sown by the seed of the adjoining trees.

30. It is here the place to mention a peculiar feature in the seeding of the Deodar in Kunáwár, to which our attention was first drawn when examining the Nachar Forest this year, which has generally been a good seed year. Of the old trees left standing on the ground in this forest, in accordance with the proposal recorded on page 21 of the Report of 1874, very few are well covered with cones, while younger trees, 30 to 50 feet high, are full of cones. This should not, however, be misunderstood. Old trees which have grown up isolated are often excellent seed bearers, but in a forest which, like Nachar, has grown up as a dense mass, it does not seem that the thinning out of the greater portion has the effect of predisposing the remaining trees to produce a full crop of seed.

All these circumstances must be carefully taken into account in the selection of the trees to be cut, the leading idea being to make sure that the clearance made is either already stocked with young growth, or becomes covered with as little delay as possible.

31. A comparison of the plan here sketched with the principles laid down to regulate the cuttings of Deodar in the forests which form part of the School Circle, on the Pabar, and in parts of Jaunsár will show that in this portion of Kunáwár we are disposed to recommend much heavier cuttings than in the outer and moister forests. This, it will readily be understood, is chiefly due to the less injury to be apprehended, in the Kunáwár forests, to the growth of young Deodar from brambles, shrubs and weeds.

Detailed proposals for each forest.

32. It will now be convenient briefly to state the chief works which should be undertaken within the next five years in the Kilba Range and in some other forests in Busáhir.

Tranda.

In this forest an area of about 50 acres was fenced three years ago. The main road and several paths which cannot be closed traverse the fenced portion, so that protection against grazing has not been complete. Nevertheless the result has been very satisfactory, and in many places there is a good show of young Deodar on the ground. The Deodar here is mixed with Spruce and the Blue Pine, and it seems most desirable to utilize the present good seed year (1881) by ringing a number of the other trees before the seed falls, in order to give room for seedlings of Deodar to spring up. If this operation proves successful, it may be possible, a few years hence, to cut a considerable number of Deodar trees in this forest.

West Nachar.

33. In the Report of 1874, pages 18 and 21 (Statements II and V), it was proposed that 50 trees should be cut to complete the first cutting, and to give sufficient light for reproduction. It was further arranged that a protection belt should be left standing along the western edge, and that the forest should be fenced. Since then 50 trees have been cut in 1876-77 and 100 trees in 1879-80, these trees having been so selected as to produce small clearances on the more gentle slopes, while only single trees were cut in the upper and steeper parts of the forest. The protection belt was left intact as laid down, and the forest has also been fenced. The inspection showed that, besides a limited amount of advance growth, a fair number of seedlings, from three to seven years old, had come up. On the whole, there is enough young growth in the forest, but it is unevenly distributed.

34. There being prospects of a good crop of seed this year, we recommend that no further cuttings be made this season; but that, after the seed now forming has fallen and has germinated, further cuttings be made by removing the marketable timber throughout the forest, except in the protection belt.

As regards the latter, we recommend that, in consideration of the expected seed, a cutting be made as soon as the seed has fallen, so as to enable the young growth to spring up. This cutting may be made in groups or narrow belts. When the present seed year has taken effect, and there should still be places where no seedlings have established themselves, a portion of the young plants in such parts of the forest where there are a greater number than are required to form a complete young forest, should be taken out and transplanted on to the blanks. Whenever practicable, two or three seedlings should be taken out, together with a lump of earth, and replanted in the same manner.

East Nachar.

35. It was proposed in 1874 to cut 600 trees in this forest in order to complete the second cutting, as well as to extend the existing fence so as to include the whole forest, and to prepare patches in order to facilitate reproduction. Since then 580 trees were cut in 1879-80 and 10 trees in 1880-81,

making a total of 590 trees. On inspection we found that, although the number prescribed had been cut, there are still marketable trees left, which should be removed as soon as practicable. In taking out this timber special care should be used not to injure the young growth more than can be helped. Any parts of this forest which remain without seedlings after the above operations have been completed, should be planted up with seedlings taken from those parts of the forest where they can best be spared.

If possible, the fence should be so extended as to include the protection belt on the west side of the forest. As soon as this has been done, groups and belts of trees should be cut out in order to give light for seedlings to spring up.

Melang and Yani.

36. In the Melang Forests a large number of Deodar trees (1,700) had been cut by Mr. Paul before 1874. The forest being mostly mixed, and the young growth being chiefly *Pinus excelsa*, it was proposed in 1874 that there should be no felling of Deodar till other pines could be worked out at the same time, and it was recommended that 1,200 trees of *Pinus excelsa* be cut in this forest within the four years succeeding 1874. Instead of carrying out this recommendation, the whole quantity was cut in one year, for which purpose one of the timber roads made by Mr. Paul has been widened and converted into an excellent slide to the river. It is explained that, on account of the necessity of making this slide, these operations could not conveniently be spread over a longer period. The constitution of this forest is not exactly such as would benefit by the cutting out of the Blue Pine. The two trees are not uniformly mixed, but the forest consists of moist places stocked with Spruce and Blue Pine, and of narrow belts of dry, rocky, often precipitous, slopes stocked with pure Deodar. Under these circumstances, the large cuttings of *Pinus excelsa* which have been made are not likely to have the effect which was contemplated in 1874.

37. The young growth on the ground consists chiefly of the Blue Pine, with a small and varying proportion of Deodar; and all that can be done to improve this state of things is to thin out the thickets of Blue Pine and thus assist the young plants of the more valuable species. In the pure Deodar forests above the village and at the back of the valley, it will be possible to cut a considerable quantity of this tree, and this should be done at an early date, as long as the timber road made for the Blue Pine operations is yet in good condition. The only portion of this forest which can be said to be really mixed, is the moist forest near the river, where some Deodar is associated with other trees. In these places there are some seedlings of Deodar, and we have considered whether it would be an advantage to ring some of the trees, to give light and thus to promote the growth of Deodar.

The difficulty in this case is that this valley is exceedingly moist, and the growth of shrubs and herbs very luxuriant, so that if more light overhead were given, it is possible that these shrubs and herbs, and not the Deodar, would profit thereby. In this, as in all other arrangements in regard to the reproduction of Deodar, it should be borne in mind that at the same elevation, the conditions of growth are different at the bottom of a moist narrow valley and on a warm exposed slope, and it should also be remembered that there is a great difference between the moister forests in the vicinity of Wangtu, near the western end of this range, and those which are higher up the river.

38. The Melang Forest is the last forest up the river in which Moru (*Quercus dilatata*) is found; and between the mouth of the Mel-gad and Wangtu a number of trees and shrubs of the outer moister hills make their appearance,* while others which belong to the drier parts of Kunáwár (such as *Acer pentapomicum*, *Fraxinus Moorcroftiana*, and *Quercus Ilex*) attain their limit between the same places. In the Yani forests the proposals of 1874 were to complete the

TREES AND SHRUBS OF THE OUTER HILLS.
Pinus longifolia.
Pistacia integerrima.
Albizzia Julibrissin.
Quercus incana.
Rhus Cotinus.
Berberis Lycium.
Zanthoxylum alatum.

first cutting by the removal of 200 Deodars and 300 Blue Pines. This has been accomplished, the number of Deodars cut having been 219. The first cutting, however, is far from complete. This forest is full of advance growth of Deodar in the lower part, and in the upper portion the young growth of Deodar is excellent on all ridges and dry and warm slopes. In order to promote the development of this young growth, it is most desirable that more light overhead should be given. This may be done by cutting Blue Pine as soon as the produce of the heavy cuttings made in Ramni has been sold. Something may also be done to give more light by ringing the Spruce and by cutting Deodar. It is impossible to frame an estimate of the quantity of Deodar that may, during the next ten years, be extracted from the Melang and Yani Forests, but so much is clear that it will be very considerable.

Punang-gad.

39. The forests on the Púnang-gad, above the gorge through which it finds its way into the Sutlej, cannot, under existing circumstances, be worked, but the local difficulties are not greater than those which existed in the Mel-gad, and timber can doubtless be extracted either by means of a timber road, or by making the stream fit for floating by blasting the rocks. The first step to be taken is to make these forests accesssible by a path, but it is not likely that they will come to be worked within the next five years.

Forests between Punang and the Kunai Ridge.

40. These forests occupy the middle slopes of a large bay of mountains, which is limited by two steep rocky ridges descending from the Batoring peak, the westernmost of which bounds the Púnang valley on the north-east, while the eastern ridge runs to the Sutlej a little north of the village of Kunai.

The forests enclosed in the large bay are known by the following local names, which may be maintained for the present :—

First.—Púnang Forest between the main ridge and a branch ridge, including the bay, at the foot of which the village of Púnang is situated.

Second.—The Phinla Forest, including Wachamchi, between the Púnang forest and the Phinla-garang.

Third.—The Jampan Forest, extending east to the Jampan-gad; also called the Halab-gad.

Fourth.—Tikru, including Wasankan from the Jampan-gad to a ridge which runs to the Sutlej west of Kilba.

Fifth.—The Tiúden or Kiúden Forest, in the bay, at the foot of which the village of Kilba is situated.

Sixth.—The Kilba or Kalba Forest, separated from Kiúden by a steep and narrow rocky ridge, a branch of the Kunai ridge.

Of these forests, Púnang, Tikru, and Kiúden had never been worked previous to 1874. In Phinla Mr. Paul cut 1,509 trees: in Jampan-Wasankan 3,120. Kilba is the only forest from which timber was extracted on a large scale before 1864.

41. As regards the young growth of Deodar and the growing stock of mature timber, matters stand as follows.

In the upper part of Kilba some 250 trees, standing over large masses of advance growth, should be removed.

Of the forests which were worked by Mr. Paul, the Jampan Forest shows satisfactory results of reproduction throughout, and the remaining trees may now be cut out, provided this can be done without doing much damage to the thickets of young growth.

In the upper part of Phinla the reproduction is also very good, but in the lower portion there are large areas with very little young Deodar, and this may to some extent be due to the circumstance that the lower part of this forest is much grazed over. In this forest there are some very remarkable plots, thickly covered with young Deodar near the upper limit of the tree, at an elevation of 10,000 feet. The present estimate gives only 400 trees: this is certainly

below the actual contents. Here also the remaining large timber may be cut out as far as this can be done without serious injury to the young growth.

We have considered whether it would not be preferable to allow the marketable timber left in Jampan and Phinla to remain standing. The damage done to the young Deodar by rolling down the logs will, in any case, be very considerable; and we do not at present see our way to recommend that the timber be exported in the shape of scantling. This is a case where the Divisional officer, acting under the Conservator's orders, must use his discretion. The first cuttings of the remaining trees must be tentative and on a small scale, and if he finds that the extraction of the timber cannot be managed without serious injury to the young growth, no further cuttings must be attempted in these forests.

42. Matters are different in the case of those forests where no cuttings at all have yet been made, or have only just been commenced. These are Púnang and Kiúden. Here we regard it as a matter of great importance that the principles explained above regarding the selection of the trees to be cut, should be carried out to the full extent, the leading idea being on the one hand to secure the regeneration of the forest, and on the other to leave only such trees standing as may be left on the ground until the young growth has attained maturity. There is no reason why the young growth now in the forest and expected to spring up should be allowed to grow to a greater age than from 60 to 100 years, when the trees which have grown up under protection from fire will doubtless have attained a marketable size. With regard to the groups and belts of poles and trees, which we propose to leave on the ground, there is no reason whatever to apprehend, provided fires are excluded, that the value of the timber will at all deteriorate if they are allowed to stand from 60 to 100 years longer. These remarks will serve to explain that, as much as possible, only poles and young healthy trees should be allowed to remain on the ground.

In Kiúden 728 trees have been cut in 1880-81, and the completion of the cuttings, in the manner here indicated, should be taken in hand in the first instance.

In Púnang, as already mentioned, very few trees have been cut, and this forest may be treated in the same manner.

43. The Tikru Forest occupies an intermediate position as regards the treatment it will require. No cuttings were made here previous to 1874, but since then the following trees have been cut :—

		Trees.
1875-76	...	800
1876-77	...	350
1880-81	...	446
Total	...	1,596

Where the older cuttings had been made, the reproduction is excellent: here the greatest care must be used not to injure the young growth by the extraction of the remaining timber; and if this cannot be accomplished, the cuttings in this part of the forest must be suspended.

Kunai.

44. The Kunai Forest is situated in the bay between the Kunai ridge and what may be designated as the Sapni ridge above the road from Kilba to Sapni. The north-western part of this forest is on bare rock, the strata of the gneiss having a strike here from east to west, and a dip of 30 degrees to the south, the slope of the hill being parallel to the surface of the strata. There is very little soil, and trees are only found in clefts of the rock. In the central part of the bay the rock is more broken up into boulders, and between these the soil is deep and rich. The lower part of this forest was worked by contractors before 1864, and Mr. Paul cut 500 trees in it between 1867 and 1870. Among the boulders and in the central part of the bay there is a good deal of growth of young Deodar, but the ground is moist, and there is also a

very luxuriant growth of brambles and other shrubs. On the face of the rock there are young trees here and there in clefts and fissures, but this part can hardly be regarded as a forest. There is a fence at the lower edge of the forest, above the road already mentioned, but during summer, when the sheep and goats of Kunai and Sapni are on the alpine pastures above the forest, they graze within this portion.

In 1874 it was recommended that 800 trees be felled. No trees, however, have been cut since that time, and, considering the rocky nature of the ground, we are not now disposed to advocate such extensive fellings. A more detailed examination of the forest will doubtless show that there are some places where trees may be cut with advantage. This may be left to the Divisional officer.

Sapni.

45. The Sapni Forest, including Kumkumi, occupies a broad shoulder which runs down to the junction of the Sutlej and the Baspa rivers.

The lower part of this forest, which is on a gentle slope with easy slides to the river, was cut and completely destroyed by fire, as described on page 32 of the Report of 1864. The upper portion, which is more distant from the river, is a mixed forest of *Pinus excelsa* and Deodar, with a little Spruce; and the north-western face of the ridge, which looks towards Kunai, is well stocked with a dense forest of poles and saplings, chiefly Blue Pine and Deodar.

In accordance with the proposals submitted in the memorandum of 1869, the whole of this forest, the area of which may be estimated at 300 acres, has been enclosed with a fence and has been protected against fires and grazing. The result is that, wherever there are seed-bearing trees, there is a satisfactory growth of young Deodar, while the slopes are blank where all the trees have been cut or burnt; and this is particularly the case in the south-eastern corner, on a dry warm slope with an easterly aspect.

In the pole forest on the west side a large number of poles of the Blue Pine were thinned out in 1879, but it would have been more satisfactory if the larger instead of the smaller trees had been removed; but even as it stands at present, the effect upon the Deodar mixed with the Blue Pine has been very beneficial.

46. In the blank portion several nurseries have been established (in 1878 and 1880), but the ground is so dry, and the slope so open, that many of the seedlings have died, and those which remain have made very little progress. In this locality, on dry loose soil and in the dry climate of this part of Kunáwár, there seems reason to apprehend that transplants are not likely to succeed, except in specially favourable seasons. We are, therefore, disposed to advocate sowing of seed in patches, these patches being prepared in carefully selected places under the shelter of rocks or shrubs, so as to shield the young plants against evaporation as much as possible. We would also strongly recommend that dry wood, leaves, and sods of turf be heaped up on each patch and burnt, so as to give the young seedlings the benefit of the stimulating influence of the ashes. This plan we are disposed to recommend generally in all sowings of Deodar in Kunáwár. These sowings are the most important cultural operations to be taken in hand at present, and an effort must be made to utilize the good supply of seed of the present year, in order to stock the whole of the blanks with Deodar.

Within the ring-fence are included several fields belonging to the village of Sapni, one of which (Engaling) is a domain of the Raja attached to the Sapni fort. These enclosures are not likely to cause any difficulty in regard to the management of the forest, and should, as a matter of course, not be interfered with.

47. In the Report of 1874 it was recommended that a cutting of 600 trees be made as soon as the fence had been completed. Cuttings may here be regulated by the general principles recommended in paragraphs 25 to 29 of the present Report; and, as the upper part of the forest is mixed, Blue Pine should, as much as possible, be cut simultaneously with the Deodar, or if there is no prospect of selling the wood, trees of other kinds might be killed by girdling them.

It should be clearly understood that whenever light is given by ringing trees of other kinds in a Deodar forest, this should be done several years before the Deodar is cut, so as to give the ground the benefit of one, or if possible of several seed years. A case which illustrates this suggestion was noticed in the upper part of the Yani Forest where, over a considerable area, the trees of Blue Pine and Spruce had been killed by the fires of *korali* cultivators; and there happening to be a number of good seed-bearing Deodar trees in the vicinity, the whole slope became covered with a thick growth of Deodar.

Runang.

48. Besides the work assigned to the next five years on the south side of the river, there are some forests on the north side which will require special attention during the same period. The Runang Forest occupies the slopes on the left side of the Runang-gad with a westerly and north-westerly aspect. A portion of this forest had been completely cut before 1864, and fires and grazing have hitherto prevented the springing up of young growth. In accordance with the proposals made in 1874, this forest was fenced in 1875 in two blocks, one above and the other below the new road; and, simultaneously, nurseries were established, and a great portion of the blank slope with a westerly aspect was planted up in 1878. The chief effect of these measures has been to cover the ground with a thick matting of grass, with a profusion of fern, particularly the Braken (*Pteris aquilina*), and with herbs. Self-sown seedlings are found in the immediate vicinity of that part of the forest which was left standing, but none were found at a distance from the trees, and seedlings were also looked for in vain near some isolated old Deodar trees. Protection clearly has not had much effect in stimulating the springing up of self-sown seedlings. In the portion below the road matters are somewhat more favourable. Of the transplants very few are alive: the best are those which were planted out near the small forest hut; these had been taken out from the forest. That portion of the fenced block which is blank is much exposed to the strong westerly winds, which sweep up the valley during a great part of the year; and it will not be an easy task to stock it artificially. We recommend sowing in patches, in a manner similar to that suggested for Sapni. The patches should be large; turf, dry weeds and other materials should be heaped up on them, and burnt when dry. A large quantity of seed should be sown in each patch, and it is hoped that the stimulating effect of the ashes will produce strong plants, which will resist the dry winds of this exposed situation.

A few miles east of Runang, a part of the Kastiarang Forest, below the road, was fenced in 1878, but no sowing or planting was done. In this block a large number of isolated trees remain, and it is reported that the effect has so far been satisfactory. This forest is round the corner, and not much exposed to the westerly winds. The fence should be maintained.

Communications.

49. Next to timber operations, the most important work to be done in the Kilba Range is the opening out of the forests by a system of paths. A lower road on the south side of the river, practicable for ponies, already exists from Wangtu bridge to Sapni, which should be maintained as a bridle-path. The bridge of Sholtu further facilitates communication between the two banks in the centre of the range. What is now required is a high level road running through the entire range, from the upper Panwi-gad through the Dippi and Kakstal Forests and the upper Deodar localities on the Mel-gad, crossing the ridge between this and the Púnang-gad above the Yani Forest, passing through the Kaling Dogri and the upper Deodar forests in the Púnang valley, and coming out in the Púnang Forest above the village of Púnang. From here this path should go through the upper part of Phinla to the Kilba Dogri above Jampan, thence through the upper part of Tiúden into Kilba and the upper part of Kunai to the top of the Sapni forest, whence it should be carried on to join the lower road at or near the village of Sapni. No attempt should be made to keep the upper road on the same level; it must, as a matter of course, follow the configuration of the ground, which is extremely irregular. This upper path cannot be made practicable for ponies, and no such thing should be attempted; but it

is most desirable to connect it with the lower road by a number of cross-paths practicable for ponies. Two such paths already exist—one up the timber road from the mouth of the Mel-gad to Ramni, and the other from Kilba to the Tiúden Forest. A third can, without difficulty, be made from the village of Sapni to the top of the Sapni Forest; and a fourth should be constructed up the valley of the Púnang-gad, following its right bank. The lower road from Kunai to Sangla, which is nearly practicable for ponies now, should be made into a bridle-path.

A pathway along the Sutlej from Wangtu has already been made to below Nachar, and this path should be continued as far as Rámpur, crossing the river by "jhúlas," or rope-bridges, wherever necessary.

The construction of a bridge at Rámpur, to facilitate communication with Pandrabis, is a necessity, and should be taken in hand during the next five years.

Order in which works should be undertaken.

50. So far our proposals regarding the work to be undertaken during the next five years. As regards the order in which the work should be done, it will probably be most convenient to complete cuttings, cultural operations, and roads, first in the eastern part of the range, that is Tikru, Kiúden, Kilba, Kunai, and Sapni; at the same time attending to Runang, and completing the cuttings in Nachar.

After this work has been completed, the Melang, Yani, and Púnang Forests, including the Púnang valley, should then be taken in hand. By that time the first period of five years will have expired, and the second period of five years will probably see the cuttings in the Púnang valley, as well as those in Dippi and Kakstal.

Protection of the forests.

51. With regard to the privileges exercised by the people in the forests, the action of the Forest officers is regulated by the terms of the lease and the rules made under it, a copy of which will be found appended to this Report. In regard to the most important point, it will be useful to state the manner in which the provisions of the lease are at present worked. As regards fires it will be sufficient to say that no forests whatever are allowed to be burnt in the whole division, including the Nogli Range, and we have nowhere seen traces of recent fires in the forests. Permission is, however, granted to burn the grassy slopes at low elevations in the main valley, as well as in the side valleys. The practice generally is to burn these grassy slopes early in spring. At that time the snow lies in the forests; there is no risk of the fires extending to them, and great liberality should be used in giving this permission. There is no object whatever in preventing the burning of the lower grass lands, below the level of Deodar, even if there should be small forest tracts included in them.

52. Korali cultivation—that is, the cutting and burning of forests to obtain one crop, or a succession of two or three crops—was prohibited by Colonel Batchelor about ten years ago, and has since been permitted on special application only. This rule is now perfectly understood, and we only found a few cases in which such clearances had been made.

In the Nogli valley, where the population is comparatively dense, the practice exists to let such clearings lie fallow for three years, and then to cut and burn the brushwood and other vegetation which has grown up upon them. This practice is not interfered with, but fresh clearings in the untouched forests are not permitted. In the Nogli valley this rule is certainly necessary, because denudation has made great progress, and on some slopes with a southerly aspect only a narrow forest belt is left along the main ridge.

A similar custom prevails in other parts of the country, and here also the cutting and burning of brushwood on fields which have thus been allowed to lie fallow is in no way interfered with.

53. In a country so thinly populated as the greater portion of Bashahir, everything must be done in order to encourage the extension of cultivation; and as *korali* clearings are in many cases the first step towards such extension,

permission should be give to make them, wherever the slopes are sufficiently gentle and circumstances are otherwise favourable to justify the expectation that the *korali* clearings will be converted into permanent fields. As a matter of course, no *korali* clearings should be made in Deodar forests, or where there is risk of avalanches and rolling stones, or the formation of ravines; nor should it be permitted in those tracts where denudation has made considerable progress and where forest has become scanty, as on the north side of the Nogli valley.

54. As regards pasture and the provision of cattle fodder, the general rule is that Oaks and all other trees may be lopped for cattle fodder and for litter, with the sole exception of Deodar; and this rule should, we consider, be maintained.

Cattle, including sheep and goats, are allowed to graze everywhere, except in Deodar forests, and for the more efficient protection, especially against sheep and goats, where cuttings have been made, it is found necessary to build fences in certain places. No general rule can be laid down on this subject, but it may be mentioned that it will probably be necessary, after the cuttings in Kiúden and Tikru are completed, to erect a fence along the lower edge of these forests. Speaking broadly and excepting localities where cuttings have been made, grazing does very little damage in these forests, and we do not apprehend any difficulties on this head.

55. In the Nogli valley dry leaves, chiefly of pines, are collected to manure fields of rice and wheat, and this practice is not interfered with, except in Deodar localities. Building-wood may be cut by the people of the valley for their own requirements, without let or hindrance. Only for Deodar and other pines is special permission required, and in the case of other pines this is always granted liberally and promptly by the Divisional officer, and it is most important that the people should be put to no inconvenience in this respect. Indeed, it is for consideration whether the interference with the use of building-wood by the people may not be limited to Deodar, special localities excepted, where it may be necessary to protect other pines also against indiscriminate cutting. Wood for agricultural and domestic purposes of all kinds, except Deodar, is free and no permission is required.

56. Upon the whole, it must be said that the forests are efficiently protected, and the difference in their condition since 1864, when the first regular inspection of them was made, is exceedingly remarkable. As will appear from the present and previous Reports, the area of the Deodar forests is limited, but in consequence of the efficient protection accorded to Deodar, since the time that the first lease was concluded in 1865, this tree has increased in a remarkable manner; and the increase of Deodar is particularly noticeable on and below the lower edge of the forests. An abundance of young growth of Deodar has sprung up among the Oak trees below the Yani Forest, as well as in the Kilba Oak forest between Sholtu and Kunai. These Oak forests are of great importance to the adjoining villages for the provision of fuel and leaves for cattle-fodder; and the protection of the Deodar which has grown up among the Oaks, and of which there are large numbers of all sizes, from seedlings to large poles, has in no way interfered with the use by the people of these Oak forests.

Demarcation.

57. Rule 3 of the schedule appended to the lease gives authority to Government to demarcate any portion of the Busáhir Forests, and to close such portion against the grazing of cattle. We have considered whether we should, on the present occasion, submit definite proposals for demarcation. The advantages of this measure would be undoubted; the most valuable portions of the forests would be selected and absolutely protected, while in the remaining area protection would be relaxed, or all interference abandoned. At a future time such demarcation will probably be found necessary, but for the next five years we consider that it will be preferable to continue the existing practice, which secures all that is required without causing any inconvenience to the people.

*Page 5, paragraph 20.

As explained in the Report* of 1874, it is only in a country so thinly inhabited as most parts of this Division, that it is justifiable to delay demarcation. My impression is that since my first visit in 1864 the population has somewhat increased, and that cultivation has extended; but, in the absence of definite

data, no certain conclusions can be formed on this subject. There seems, however, good ground for hoping that the population in this beautiful country will now begin to increase, and with the increase of population the necessity for demarcation will doubtless make itself felt.

Conclusion.

58. The management of the Busáhir Forests by the British Government not only gives to His Highness the Raja a large annual income, but furnishes remunerative employment to the people, of whom, every year, large numbers come forward to seek such employment on the timber works and on the works of improvement. The terms of the lease give great power to the British Government, and the officer entrusted with the management of these forests must always bear in mind that, though one object of the agreement may have been to secure a permanent and steadily increasing supply of Deodar timber to meet the requirements of the plains in the Punjab, yet the chief aim of Forest Administration in Busáhir must be to promote the permanent welfare of its people.

APPENDICES.

I.

Statement showing the estimated number of first class Deodar trees in the forests of the Busáhir Division, Punjab.

No.	Name of forest or locality.	Number of 1st class trees.			Remarks.
		Estimated in 1874.	Cut between 1874 and 1st April 1881.	Estimated in 1881.	
	I.—Nogli Range.				
1	Bhera-gad ...	...	...	1,000	
2	Mashada-gad ...	6,000	...	6,501	
3	Nogli-gad ...		...	3,009	
4	Gaura ...	200	...	200	
	Total ...	6,200	...	10,710	
	II.—Tranda Range.				
5	Manglad and Darn-ghati ...	500	...	500	
6	Kandalú ...	500	...	745	
7	Chaunda ...	...	...	2,090	
8	Tranda ...	500	...	385	
9	Soldang (Bari) ...	400	...	125	
10	Kangose and Poinda ...	...	...	87	
11	Sungri ...	600	...	1,400	
12	Guterang ...	...	...	121	
13	West Nachar ...	1,954	150	458	
14	East Nachar ...		590	346	
15	Lower Panwi-gad ...	1,000	...	1,000	
	Total ...	5,454	740	7,257	
	III.—Kilba Range.				
16	Upper Panwi-gad ...	1,000	...	1,000	
17	Dippi and Kakstal ...	2,000	440	1,852	
18	Ramni (or Mel-gad) ...	1,200	...	1,200	
19	Yani ...	800	219	581	
20	Púnang ...	3,000	...	3,000	Includes Púnalang.
21	Phinla ...	1,500	300	400	Includes Wachamchi.
22	Jampan ...	500	100	846	
23	Tikru ...	3,000	1,596	1,404	Includes Wasankan.
24	Kiúden ...	4,000	728	2,778	
25	Kilba ...	250	300	250	
26	Kunai ...	1,000	...	1,000	
27	Sapni ...	2,000	...	2,000	Includes Kumkumi.
	Total ...	20,250	3,683	16,311	
	IV.—Kailás Range.				
28	Burna	1,000	...	1,000	
29	Shoang	2,000	...	2,000	
30	Chasú				
31	Chidu	1,000	...	1,000	
32	Limsantang				
33	Rukti				
34	Túgla	600	...	600	
35	Hurba				
36	Chota Barseri	300	...	300	
37	Bara Barseri				
38	Kargya	200	...	200	
39	Seringé				
40	Ralli	1,000	...	1,000	
41	Mebar	2,500	...	2,500	Includes Kulangar.
42	Barang				Includes Chirang-gad.
	Carried forward ...	8,600	...	8,600	

No.	Name of forest or locality.	Number of 1st class trees. Estimated in 1874.	Cut between 1874 and 1st April 1881.	Estimated in 1881.	Remarks.
	IV.—Kailás Range—continued.				
	Brought forward ...	8,600	...	8,600	
43	Tangling	800	...	800	
44	Poari	...	...	...	Includes Búling-ing.
45	Purbani				
46	Riba	5,500	...	5,500	
47	Badar				
48	Rispa				
49	Tidong	600	...	600	
	Total ...	15,500	...	15,500	
	V.—Chini Range.				
50	Ashrang				
51	Gyamsering	3,000	...	3,000	
52	Shalik				
53	Lipi				
54	Bangrang				
55	Shalamti				
56	Kírang	5,000	...	5,000	
57	Jangi				
58	Karti				
59	Akhpa				
60	Rarang				
61	Korangé	4,000	...	4,000	
62	Kashang				
63	Pangi				
64	Boktu				
65	Teling	3,000	...	3,000	
66	Duni				
67	Chini				
68	Rogi	750	...	750	
69	Kastiarang	200	...	200	
70	Runang	750	...	750	
71	Miru				
72	Urni	...	...	...	Not estimated.
73	Chagaon				
	Total ...	16,700	...	16,700	
	VI.—Pandrabis Range.				
74	Wangar	5,000	...	5,000	Includes Krabé and Panbal.
75	Siku	200	...	200	
76	Lasti				
77	Sakh Natpa	1,500	...	1,500	
78	Dangrang				
79	Katchang	5,000	...	5,000	
80	Rokchang				
81	Garshú				
82	Chota Kamba	700	...	1,978	
83	Bara Kamba	200	...		
84	Rupi	750	...	2,175	
85	Khau				
86	Chalandi	3,000	...	3,000	
87	Kyuncha				
88	Gunu-gad	10,000	...	9,972	
89	Raunché	1,000	...	1,000	
	Carried forward ...	27,350	...	29,825	

No.	Name of forest or locality.	Number of 1st class trees. Estimated in 1874.	Cut between 1874 and 1st April 1881.	Estimated in 1881.	Remarks.
	VI.—Pandrabis Range—continued.				
	Brought forward ...	27,350	...	29,825	
90	Sechi	5,000	...	8,530	
91	Sirpara				
92	Kandrara-gad	3,000	...		
93	Sukecho				
	Total ...	35,350	...	38,355	
	Abstract.				
I	Nogli Range	6,200	...	10,710	
II	Tranda „	5,454	740	7,257	
III	Kilba „	20,250	3,683	16,311	
IV	Kailás „	15,500	...	15,500	
V	Chini „	16,700	...	16,700	
VI	Pandrabis „	35,350	...	38,355	
	Grand Total ...	99,454	4,423	104,833	

II.

Lease of the Busáhir Forests.

Whereas by the terms of an agreement having date at Simla the twentieth day of June 1864, His Highness the Raja of Rámpur-Busáhir, having requested the aid of the British Government in the management of his forests, did for that purpose lease the said forests to the British Government; and

Whereas by a further agreement, dated the first day of August 1871, His Highness the said Raja did grant to the British Government (in consideration of certain payments therein provided to be made) his rights in waif and wind-fall timber; and

Whereas it is now desirable to embody the terms of the said agreements in one agreement, and further in such new agreement to secure to His Highness a more equitable remuneration in consideration of the grant of his forests and other rights, and at the same time to make more definite provision for the conservancy of the forests aforesaid:

The following articles have been agreed upon between His Highness the Raja of Rámpur-Busáhir, of the one part, and Captain Robert Parry Nisbet, Superintendent of Hill States, Simla, on behalf of the British Government, of the other part:—

I.—From and after the date of the execution of this present agreement, the former agreements, bearing date at Simla, the 20th June 1864 and 1st August 1871, respectively, shall cease to be of force, and shall be deemed to be cancelled and superseded by this present agreement.

II.—The term "forest," as used in these articles, shall mean and include—

(*a*) Those tracts of country covered with trees, or from which the trees have been felled, which pay no revenue as cultivated land to the Rámpur-Busáhir State.

(*b*) Such other tracts of land, cultivated or uncultivated, covered with trees or barren, as the Raja of Rámpur-Busáhir may from time to time consent to give up for the purpose of consolidating or extending the area of any existing forest or of forming new plantations or forests.

III.—In consideration of the sum of Rs. 10,000 to be paid in two half-yearly instalments, *viz.*, on the 30th April and 31st October in every year, His Highness the Raja of Rámpur-Busáhir hereby grants the entire and sole control of the whole forests of Busáhir to the British Government.

IV.—The Raja of Busáhir further grants to the British Government all his rights in unclaimed waif, drift and wind-fall timber within his territory, both on land and in water, and further grants to the said Government the entire control of the rivers and streams in Busáhir in so far as concerns the floating and management of timber in transit; and the Raja of Busáhir further agrees that the British Government shall have power to take up land not being forest, when such land is required for timber slides and other necessary works,

Provided always that fair and equitable compensation shall be paid therefor to the persons entitled thereto.

V.—The British Government shall on its part appoint and maintain, at its own expense, such officers and such subordinate establishments as to it may seem good for the purpose of controlling, managing and working the said forests, and controlling and managing the transport and floating of timber as aforesaid.

The term "Forest Officer" when used in this agreement or the schedule thereto annexed, shall be deemed to mean any officer so appointed.

VI.—The rules set forth in the schedule annexed, for the protection and management of the forests and for regulating the floating of timber and other matters, shall be deemed to be in force throughout Busáhir, and the British Government may invest any Forest Officer with all or any of the powers of a Magistrate as described in the Code of Criminal Procedure in force in British India, to be exercised within the State of Busáhir for the purpose of trying and punishing offences against the rules aforesaid.

And the Raja of Busáhir engages to render every aid required by the officer or officers authorised to exercise such powers, for bringing to justice all persons charged with offences against the rules, and for enforcing any lawful judgment awarded against them.

VII.—Further, it is agreed that, during the currency of this lease, the whole preservation, control and right of shooting game-birds in the Busáhir forests shall exclusively belong to the British Government. Licenses to shoot in the Busáhir forests shall be granted only by the Superintendent of Hill States.

Provided always that the Raja of Busáhir may grant annually to residents of Busáhir licenses to shoot game-birds for their own consumption, but not for sale: the number of such licenses shall not exceed thirty. Any person found shooting without a license, or netting, trapping or snaring game-birds, shall be liable to the penalties mentioned for such offences in the rules forming a schedule to this lease.

VIII.—The whole cost of conserving the forests in Busáhir under the rules annexed, together with all costs of felling and transporting timber for the use of the British Government, and of maintaining the necessary establishments in such forests, shall be borne by the British Government.

IX.—This agreement shall continue in force for a term of fifty years commencing from the date of the present agreement. On the expiry of this term it shall be renewable at the pleasure of the British Government for a further term of fifty years. It shall be again renewable in like manner at the end of every term of fifty years.

Provided always that any alterations in the Forest Rules attached hereto, that may be agreed to by both parties, may be made at any time without affecting the continuance of this agreement.

Executed this first day of November 1877 at Simla.

SHAMSHER SINGH,
Raja of Busáhir and Rámpur.
ROBERT PARRY NISBET,
Superintendent of Hill States.

In presence of—

B. H. BADEN-POWELL,
Conservator of Forests.
ABDULLA MAULVI.

SCHEDULE.

Rules for the Busáhir Forests.

1. UNLESS expressly permitted by the chief Forest Officer, the following acts are prohibited in all forests of the Busáhir State:—

(*a*) Breaking up forest land for cultivation.
(*b*) Setting fire to grass tracts in the vicinity of forests, or negligently permitting fire to extend thereto.
(*c*) Setting fire to trees, brushwood, or stumps.
(*d*) Cutting out slabs, torches, &c., from the stems of standing trees, barking or boring for turpentine, or otherwise injuring trees.
(*e*) Felling or lopping trees.
(*f*) Selling timber.
(*g*) Removing dead leaves and surface soil.
(*h*) Shooting without a license, netting, trapping or snaring any game-bird.

2. Permission free of charge shall be given by the Forest Officer of Busáhir to all zamindars, who may require it, to break up forest land for cultivation, to cut timber for fuel, charcoal, house-building and vine frames, to cut and collect branches and leaves for cattle fodder and manure, to burn grass for pasture, to cut torches and to collect turpentine, bark, roots, ringall and other minor forest produce.

These privileges shall be exercised in such portions only of the forest as the Forest Officer shall from time to time assign.

The collection of the seeds of the Ri (Neoza) shall be free to all who have a right to collect them.

3. The British Government shall have power to demarcate or fence any portion or portions of the forests in Busáhir.

If the boundaries of any demarcated forest are not clearly indicated by roads, rivers, or other existing boundaries or landmarks, they must be marked out by permanent marks in such manner as the Punjab Government may direct.

4. In the demarcated or fenced forests grazing by cattle, except by permission of the Forest Officer of Busáhir, is prohibited, in addition to the prohibitions enumerated in Rule I.

5. The Raja of Busáhir will furnish an indent to the British Government for any timber he may require, specifying the amount and kinds of wood and the purpose for which it is to be applied. Such timber shall not be applied to other purposes than those specified in the indent, and shall not be sold.

It will rest with the Punjab Government to decide what quantity shall be given.

6. No person shall, without the permission of the Forest Officer of Busáhir, remove, cut up, burn, deface the marks of, or mark any timber in transit, whether stranded or floating, provided that this rule shall not interfere with the privilege of the villagers to take for fire-wood stranded pieces of broken timber, which are not, however, to be larger than one man can lift by himself.

7. Any person who breaks Rule 1, 4 or 6, shall be liable, on conviction before a Magistrate, to fine not exceeding Rs. 200, or in default of payment, to three months' imprisonment with or without hard labour.

III.

Note on the Forests in Madhan and adjoining territories; by D. Brandis, Inspector General of Forests: dated Dehra Dun, the 12th September 1881.

In September and October 1867, I examined certain Deodar-producing forests near Simla, chiefly those situated on the flanks and side spurs of the high ridge which extends from Hattú to the Shâli Peak, dividing in its eastern part the Giri valley, and in its western part the Nowle-gad, from the Sutlej. At that time the forests described had, with few exceptions, never been worked. Since then, however, the demand for timber at Simla, and for railway sleepers in the plains, has increased largely; cuttings have been made in all the forests, and in some all the marketable timber has been cut out.

2. In a note regarding these forests which I submitted at the time to Government, and which was printed in the Proceedings of the Punjab Government for December 1867, a brief account of the state of those forests at that time was recorded. Since then I have had several opportunities of again examining most of them, and it will be useful to submit a few remarks regarding their present condition. The forests in the vinicity of the Sháli peak were visited by me in June last. On the 16th I walked from Narkanda along the main ridge to Barána, a large village in Madhan at the foot of the Tika peak, and on the 17th I went from Barána to the top of the Sháli and then down to Kanól in Bajji.

3. *Tangri Forest,* in Komharsen, on steep dry slopes, facing west and south-west in the valley which descends from Hattú westward above Daru village. The Deodar-producing area is of small extent, occupying only a number of steep dry and sunny slopes. It is surrounded on all sides by dense forest of Spruce and Silver Fir, and is broken up by numerous clearings made for *kurali* cultivation. Work was commenced in 1877, and is still going on. The traders who have purchased the timber from the Rana are Tiku and Devi Churn. All timber is cut into sleepers, broad and narrow gauge, which are carried to the Sutlej below Komharsen.

4. *Narainti Forest,* in Komharsen.—This is the large forest of Silver Fir and Spruce, with the Bird Cherry and Maples, which covers the extensive slopes, with northerly aspect and easy gradient, which are situated at the back of the high ridge which joins the Tika peak and the high hill between Muttiana and Narkanda. In the forest several traders from Simla commenced work about a year ago. They cut trees of the Silver Fir *(Abies Webbiana)* for which they pay the Rana at the rate of Rs. 2-8 per tree. I saw their works, which extend over a large area, and they have cut many hundreds of the largest trees. The timber is cut up into $9 \times \frac{3}{4}$ inch planks, 10 feet long, which, it is said, are sold at Simla at the rate of 3 planks per rupee. The planks are carried by coolies to the high road, which they reach at a place called Sandu, between Theóg and Muttiana.

5. It is very remarkable that it should pay to carry this inferior timber on men's backs to Simla, a distance of at least 30 miles, more than 5 of which are over bad road with steep ascents and descents. There is still a considerable quantity of large timber of Spruce in Koti, on the Mahásu ridge, the wood of which is acknowledged to be better than that of the Silver Fir, and which is within 8 miles of Simla. Possibly the Rana may be unwilling to sell these trees, or there may be other reasons which may make it more profitable for the traders to cut the timber in Komharsen, though the distance is much greater. Timber operations, chiefly of Blue Pine, are carried on, on a large scale, in the forests of the Kunaiti Chief, who is tributary to Busáhir, between Kotgarh and Narkanda. The sleepers (broad gauge) are carried to the Sutlej, and it is said that they sell at the rate of Rs. 2-12 per sleeper at Phillour. But for these sleepers the land carriage is not more than 8 miles, and it is all down hill on good roads.

6. *Katla Forest,* formerly a very fine forest on the ridge east of the Tika peak, in which the Deodar is mixed with the Blue Pine and other trees. Some of the Deodar here, on the top and the northern slope of the ridge, is in Komharsen, but the main portion is in Keonthal, and this is on a steep slope with south-westerly aspect. This part of the forest has been entirely destroyed, all large trees having been cut, and the smaller trees which were exceedingly fine and numerous having been killed by fire. The timber from this forest was all cut into sleepers which were carried up to the ridge and then partly slid down, partly carried down, to the river. The Katla Forest was very fine and extensive, and is entirely destroyed now. The supply of Deodar sleepers from this locality together with that obtained from the Tangri forest in Komharsen, and from other Deodar forests in the vicinity, have contributed to the impression, which has gained ground of late years, that inexhaustible supplies of Deodar timber are available in the Sutlej valley outside the forests which are under the control of the Forest Department. These forests, it is true, have yielded large quantities of Deodar timber for railway purposes, but their resources are now coming to an end, and the sooner this is generally understood the better.

7. *Forests in Madhan near the village of Barána.*—The village of Barána is situated near the head-waters of the Nowti stream, which, after rounding the south end of the Sháli, joins the Sutlej above Suni. The fields of the village are enclosed by spurs which descend from the Tika peak, and which at this elevation (7,000 to 8,000 feet) are all more or less stocked with Deodar, Spruce and Moru. Most Deodar trees above 4 feet 6 inches in girth have been cut and sawn up into planks, scantling and sleepers. The sleepers (both sizes) are either carried up to the ridge near the Tika peak and then slid and carried down to the Sutlej, or they are floated down by the Nowti stream to the main river. On their passage through the Bajji territory these sleepers pay transit duty at the rate of one anna per sleeper. The planks and scantling are carried to Simla, either by the high road *viá* Theóg, or they cross the Nowti valley and are carried up to Simla *viá* Deoti and Mushobra.

The rate paid to the Rana of Madhan is Re. 1-4 for each foot in girth for Deodar, so that trees six feet in girth fetch Rs. 7-8. No other timber is exported from Madhan except Deodar. In the Barána Forests a small quantity of timber remains to be cut, and work still continues.

8. *Sháli Forests.*—The south face of the high limestone range which joins the Sháli and Tika peaks was formerly stocked with a valuable Deodar forest, extending over the entire breadth of the territory of Madhan. Deodar trees of good size were also numerous in many places on the north side of the range, in the territory of Bajji. The export of timber from Madhan commenced ten years ago, and nearly every large tree on the slopes of the Sháli has now been cut. I examined these forests in 1867, and passed through them on my present visit. In the note of 1867 adverted to above, the area of Deodar forest in Madhan, that might be worked to advantage, was estimated at 1,000 acres, and of a much larger area it was said that Deodar could not be advantageously exported from it. It was also explained that the chief Deodar localities in Madhan were in three valleys, the westernmost being that which descends from the Sháli peak (Rishála) and which lower down expands into an extensive terrace of undulating ground, with excellent fields and several large villages, of which Bhóg, Kulja, and Rajpúr are the chief. The next valley to the eastward is deep and narrow, with an exceedingly steep head. The rock in these two valleys is all limestone, and there are no springs, nor is there running water in them. The third valley is that of Barána. Here the rock is shale, and water is abundant.

9. In all these forests the slopes, which fourteen years ago were stocked with a most valuable Deodar forest, are nothing now but a sea of stumps of all sizes, down to 12 inches in diameter. A few saplings and, here and there, an old, gnarled, or irregularly shaped tree have been spared.

But there is this difference between the forests in Madhan and the Katla Forest in Keonthal, that the Madhan Forests, though every marketable tree has been cut, are carefully protected from fire. In one instance only did I see a considerable area burnt, and this was in the forest through which we passed on our way from the Bhóg terrace to the Sháli peak, the fire having been caused, it was said, by a timber-cutter's hut having been burnt. Neither the Thakur of Madhan, nor the Raja of Bajji, permit the firing of their forests, and the people who set fire to the grass in them, or on waste lands, are punished heavily.

10. The timber from the Madhan Forests west of Barána is, wherever possible, cut into sleepers (we saw chiefly broad-gauge sleepers), and these, if near the ridge, are carried up and then partly slid, partly carried down to the Sutlej. If lower down, the sleepers are carried to the Nowti-gad and floated during the freshes. The sleeper work is said to be all in the hands of two baniyas of Kasauli, Devan and Kunaya.

Trees which are not large enough to yield sleepers are cut up into planks and scantling, and these are carried to Simla *viá* Mushobra. The planks sent to Simla are 10 feet long, 9 inches broad, and either ¾ or 1 inch thick. The rates paid in Madhan for cutting the trees, sawing the planks, and carrying them to Simla, have been stated to me as follows:—

For cutting 100 planks, Rs. 2-8 to Rs. 5.
„ sawing „ „ 10 to „ 14.
„ carrying each 1 inch plank, 4 annas.
„ „ „ ¾ „ „ 3 „

Strong men earn Rs. 1-8 by each trip, which takes them three days generally, and they carry 6 one-inch planks, measuring 3¾ cubic feet, which quantity, at the rate of 30 lbs. per cubic foot, weighs 112 lbs.

The sleeper work is heavier, and this is done by coolies from Kulu, Mandi and Láhul, while the carriage of planks and scantling to Simla from Madhan is mostly done by people from the neighbouring territories, Kotkhái, Kotgarh, &c.

11. The export of timber, which a few years ago was very brisk, has already diminished considerably. Large quantities of broad-gauge sleepers I found collected near the ridge, to go to the Sutlej, as well as lower down the slopes to be carried to the Nowti-gad. It is not likely, however, that the export of sleepers will last more than a year. Planks and scantling for Simla will probably still be available from this source a few years longer, but then the supply will come to an end.

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Only one forest is left untouched in the Madhan territory, and that is the Kiari Forest in the valley above Kiari, the residence of the Thakur, on the left bank of the Nowti-gad. In this forest there has hitherto been cutting for local requirements only. In the greater part of the Madhan territory the people use large planks of Deodar, 10′ × 15″ × 2″, for roofing their houses. In many cases, as in the Kulja village, we found large stores of such planks collected for future use; but after these stores have been used, it will be difficult, and in most cases impossible, to obtain the large roofing planks from the forests.

12. *Bajji Forests.*—From the back (north side) of the Sháli descend two valleys, both running westward. One divides the Sháli from the Biru Tikar (Little Sháli); this is called Kanréd, while the other and larger valley drains the bay formed by the back of the Sháli-Tika ridge. The heads of these valleys are stocked with a beautiful mixed forest of Spruce, Silver Fir (called Tanera in this part of Bajji), Deodar, and Cypress (Galla), the latter found chiefly on steep rocky ground. Most of the large-sized Deodar trees in this forest have been cut and exported as sleepers *viâ* the Sutlej, and at present no work is going on in the upper part of the Bajji forests at the back of the Sháli and the main ridge.

But I was informed that, lower down the slopes, sleepers are cut, not of Deodar, which is exhausted, but of Cypress, Spruce, and other trees, and that these sleepers are floated down the Sutlej.

13. *Conclusion*.—The forests in Busáhir are now the only ones from which any large supplies of Deodar timber may be expected to come down the Sutlej river. In the other States which adjoin that river the forests are, as regards Deodar, either exhausted already or will be exhausted at an early date, and meanwhile a considerable export of timber of other kinds from these forests has commenced.

The timber requirements of Simla were met originally by cuttings made on the spot, and afterwards on the Mahásu Range. When these sources were exhausted, the Cheog Forest in Keonthal was worked; and this forest, the area of which was estimated in 1867 at from 1,000 to 1,200 acres, supplied the requirements of Simla during a period of ten years, until about 1870. Even now it yields some timber, which is chiefly cut in that portion near the Deota, which was formerly reserved and scrupulously protected as a sacred forest. Subsequently other forests in the vicinity of Fagu came to be worked, and cuttings were also commenced in the Madhan Forests. As long ago as 1866, a number of long beams were brought to Simla, for the repair of the church, from one of the forests near the Sháli, but the regular export of timber to Simla, from Madhan, did not commence until 1870.

14. At present this source also is nearly exhausted, and although a few Deodar forests remain at a greater distance from Simla than those which have already been worked, they cannot supply the requisite quantity for more than a few years. When this source comes to an end, nothing probably will remain save a more extended use of the other pines; while, as regards Deodar, the only plan will be to float the timber from the Busáhir Forests down the Sutlej, to take it out at Suni, and to carry it to Simla.

The timber will probably be more expensive than that obtained under the existing practice, but for this there is no help. Government exercises no control whatever over the forests which have hitherto supplied Simla with timber; hence they have been worked recklessly, and their resources are now nearly exhausted. Nevertheless, owing to the soil and other circumstances being exceedingly favourable for the growth of Deodar, an abundance of young Deodar has come up in many of those localities where timber has been cut for the requirements of Simla. The forest on the Simla hill now consists of poles 50 years old and more. Forty to fifty years hence these will have grown up into mature trees, and the Simla forest may then furnish a limited quantity of timber a second time. On the Mahásu Range there are large extents of pole forest about 30 years old, and considerable areas in the Cheog forest have reproduced themselves and are now stocked with Deodar of younger growth. But the regeneration of Deodar has nowhere been complete; in many places Oaks, Blue Pine and Spruce have taken its place; while elsewhere the result of the cutting has been to clear away the forest entirely. Although, therefore, these forests, which have furnished the timber requirements of Simla between, say, 1830 and the present time, may, commencing with 1930, furnish a second yield of timber, still that supply will certainly be much less in quantity than the first, and the timber floated down the Sutlej from Busáhir will be required to supplement the yield of the local forests.

Hitherto the local resources have been sufficient, not only to supply the requirements of Simla, but also to enable traders to export timber to Umballa, which is sent down from Simla on the carts which bring up the supplies for that station, and which would otherwise return empty to the plains. This trade may be expected to diminish as the price of Deodar timber brought to Simla increases. It is not likely that the timber from Busáhir, which we expect will eventually be taken out at Suni and carried on men's backs to Simla, will be able to compete at Umballa with the timber which is floated all the way down the Sutlej to the railway.

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